

HW 8 Basic Trig Identities (14.3)

I will be able to use basic trig identities to rewrite trig functions.

Name Key

Basic Trig Identities:

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\cos^2 \theta + \sin^2 \theta = 1$$

$$\tan^2 \theta + 1 = \sec^2 \theta$$

$$1 + \cot^2 \theta = \csc^2 \theta$$

$$\sin^2 \theta = 1 - \cos^2 \theta$$

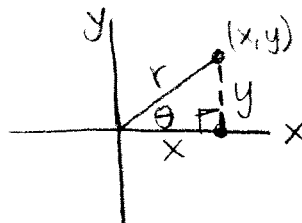
$$\cos^2 \theta = 1 - \sin^2 \theta$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

Prove that $\tan \theta = \frac{\sin \theta}{\cos \theta}$

definition of $\tan \theta$ $\frac{y}{x} = \frac{\frac{y}{r}}{\frac{x}{r}}$ definition of $\sin \theta$
definition of $\cos \theta$



$$\frac{y}{x} = \frac{y}{r} \cdot \frac{r}{x} \text{ fraction rules}$$

$$\frac{y}{x} = \frac{y}{x} \text{ fraction rules}$$

Write each expression in terms of a single trig function.

1.) $\cot \theta \sin \theta$

$$\frac{\cos \theta}{\sin \theta} \cdot \sin \theta = \boxed{\cos \theta}$$

2.) $\tan \theta \csc \theta$

$$\frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\sin \theta} = \boxed{\frac{1}{\cos \theta}}$$

3.) $\tan \theta \sec \theta \sin \theta$

$$\frac{\sin \theta}{\cos \theta} \cdot \frac{1}{\cos \theta} \cdot \sin \theta =$$

$$\frac{\sin^2 \theta}{\cos^2 \theta} = \boxed{\tan^2 \theta}$$

4.) $\left(\frac{\sin^2 \theta}{\cos \theta} \right) (\csc \theta)$

$$\frac{\sin^2 \theta}{\cos \theta} \cdot \frac{1}{\sin \theta} = \frac{\sin \theta}{\cos \theta} = \boxed{\tan \theta}$$

5.) $\frac{\sin \theta}{\tan \theta} = \frac{\sin \theta}{\frac{\sin \theta}{\cos \theta}} = \frac{\sin \theta}{1} \cdot \frac{\cos \theta}{\sin \theta} = \boxed{\cos \theta}$

6.) $\left(\frac{\cos \theta}{\tan \theta} \right) (\sin \theta)$ ①

$$\frac{\cos \theta}{\frac{\sin \theta}{\cos \theta}} \cdot \sin \theta =$$

$$\frac{\cos \theta}{1} \cdot \frac{\cos \theta}{\sin \theta} \cdot \frac{\sin \theta}{1} =$$

$$\boxed{\cos^2 \theta}$$

Use identities to verify that each statement is true.

$$7.) \frac{\sec \theta}{\csc \theta} = \tan \theta$$

$$\frac{\frac{1}{\cos \theta}}{\frac{1}{\sin \theta}} = \tan \theta$$

$$\frac{1}{\sin \theta}$$

$$\frac{1}{\cos \theta} \cdot \frac{\sin \theta}{1}$$

$$\frac{\sin \theta}{\cos \theta} = \tan \theta$$

$$\tan \theta = \tan \theta$$

$$8.) \frac{\tan^2 \theta}{\sec^2 \theta} = \sin^2 \theta$$

$$\frac{\tan^2 \theta}{\frac{1}{\cos^2 \theta}} = \sin^2 \theta$$

$$\frac{1}{\cos^2 \theta}$$

$$\tan^2 \theta \cdot \cos^2 \theta = \sin^2 \theta$$

$$\frac{\sin^2 \theta}{\cancel{\cos^2 \theta}} \cdot \cancel{\cos^2 \theta} = \sin^2 \theta$$

$$\sin^2 \theta = \sin^2 \theta$$

$$9.) \cot^2 \theta = \cos^2 \theta \csc^2 \theta$$

$$\cot^2 \theta = \cos^2 \theta \cdot \frac{1}{\sin^2 \theta}$$

$$= \frac{\cos^2 \theta}{\sin^2 \theta}$$

$$\cot^2 \theta = \cot^2 \theta$$

$$10.) \frac{\cos \theta}{1 - \sin^2 \theta} = \sec \theta$$

$$\frac{\cos \theta}{\cos^2 \theta} = \sec \theta$$

$$\frac{1}{\cos \theta}$$

$$\sec \theta = \sec \theta$$

$$11.) \frac{\sin \theta}{1 - \cos^2 \theta} = \csc \theta$$

$$\frac{\sin \theta}{\sin^2 \theta} = \csc \theta$$

$$\frac{1}{\sin \theta} = \csc \theta$$

$$\csc \theta = \csc \theta$$

$$12.) \tan^2 \theta = \sin^2 \theta \sec^2 \theta$$

$$\tan^2 \theta = \sin^2 \theta \cdot \frac{1}{\cos^2 \theta}$$

$$\tan^2 \theta = \frac{\sin^2 \theta}{\cos^2 \theta}$$

$$\tan^2 \theta = \tan^2 \theta$$